

**Before The
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of

Revisions to Broadcast Auxiliary Service
Rules in Part 74 and Conforming
Technical Rules for Broadcast Auxiliary
Service, Cable Television Relay Service
and Fixed Services in Parts 74, 78 and
101 of the Commission's Rules.

Telecommunications Industry Association,
Petition for Rule Making Regarding Digital
Modulation for the Television Broadcast
Auxiliary Service

Alliance of Motion Picture and Television
Producers, Petition for Rule Making
Regarding Low-Power
Video Assist Devices in Portions of the
UHF and VHF Television Bands

ET Docket No. 01-75

RM-9418

RM-9856

To The Commission:

COMMENTS OF GLOBALSTAR, USA, INC. AND GLOBALSTAR, L.P.

Globalstar USA, Inc. ("GUSA") and Globalstar, L.P. (collectively "the Globalstar Parties"), pursuant to Section 1.415 of the Commission's Rules, hereby file their comments on the Notice of Proposed Rulemaking ("Notice") issued March 21, 2001, FCC 01-92, in the above-referenced proceeding.

I. STATEMENT OF INTEREST

GUSA is the United States service provider for the Globalstar™ nongeostationary orbit Mobile Satellite Service ("NGSO MSS") system. Globalstar, L.P., holds the right to offer capacity on the Globalstar™ system and owns and operates the international MSS business. As

discussed below, their interests will be affected by the Commission's decision in this proceeding because the frequencies used by the Globalstar™ system for feeder downlinks (6875-7055 MHz) overlap with the 7 GHz frequencies (6875-7125 MHz) currently shared by licensees of the Broadcast Auxiliary Service ("BAS") and the Cable Television Relay Service ("CARS") (collectively, "broadcasters"). Moreover, Globalstar, L.P., is an applicant for a 2 GHz MSS satellite system (1990-2025/2165-2200 MHz), and the 1990-2025 MHz band is currently used by Broadcast Auxiliary Services.

II. THE COMMISSION SHOULD PLAN FOR COORDINATION OF ALL CO-PRIMARY SERVICES IN BANDS USED BY BROADCAST AUXILIARY SERVICES

Among the issues the Commission is examining in this rulemaking are the relationships among the BAS and the radio services that share frequency bands with the BAS.¹ The Commission has stated that one of its main goals is to ensure that licensees that share spectrum can operate in an environment in which the potential for interference is minimized.² While the Commission has recognized that "[i]nterference protections are essential to spectrum usage rights to prevent licensees from unduly affecting other licensees in terms of system operation or cost," the Commission's intent is "to establish rules that are no more restrictive than necessary to achieve [its] goals in order to provide maximum flexibility to ... licensees."³ Among the specific proposals made by the Commission to address the sharing of frequency bands between BAS and other licensees is the following:

We propose to require TV BAS and CARS services to prior coordinate their frequency use when using shared frequency bands. This proposal would serve to

¹ Notice, ¶ 2.

² *Id.*, ¶ 3.

³ *Id.*

minimize instances of harmful interference that occur when a new station begins transmitting.⁴

The Globalstar Parties applaud the Commission's goals and the general thrust of its proposals to minimize instances of harmful interference in frequency bands shared by BAS and/or CARS with other licensed services and to do so with a minimum of service restrictions. However, the Commission should include in this agenda consideration of other services that share bands with BAS and CARS.

The BAS stations that provide transmission services from remote locations to the studio can be (1) fixed, (2) mobile (terrestrial) or (3) airborne in the form of airborne TV pick-up stations ("ATVPUs").⁵ The frequency bands identified in the *Notice* as allocated to BAS are 6425-6525 MHz, 2025-2110 MHz, 2450-2483.5 MHz, 6875-7125 MHz, 12.7-13.25 GHz, and 17.7-19.7 GHz.⁶ CARS stations are point-to-point or point-to-multi-point microwave systems used by cable and MMDS (wireless cable) operators to receive signals from remote locations.⁷ CARS stations may operate on the following shared frequency bands: 1990-2110 MHz (mobile only), 6425-6525 MHz (mobile only), 6875-7125 MHz (mobile only), 12.70-13.20 GHz, and 17.70-19.70 GHz.⁸ Of these bands, BAS and CARS share the 6875-7125 MHz band ("7 GHz band") with the proposed allocation for NGSO MSS feeder downlinks and 1990-2025 MHz with the allocation for MSS user links.

⁴ *Id.*, ¶ 4.

⁵ *Id.*, ¶ 1. The fixed links used to send signals from the studio to the transmitter for broadcast to the public are called studio-to-transmitter links or "STLs." *Id.*, ¶ 10 n.10.

⁶ *Id.*, ¶ 9.

⁷ *Id.*, ¶ 2 n.1.

⁸ *Id.*

In 1996, the Commission authorized the Globalstar system to use the 6875-7055 MHz band for NGSO MSS feeder links, subject to the rules adopted in ET Docket No. 98-142.⁹ The Commission already has issued GUSA or its affiliates eight separate earth station licenses (for two clusters of gateway earth stations) for the NGSO MSS feeder links, and Globalstar™ has been providing commercial service using the 6875-7055 MHz band for over a year.

The allocation of the 6700-7075 MHz band for NGSO MSS feeder links is pending in ET Docket No. 98-142, consistent with the international allocation adopted at the 1995 World Radiocommunication Conference.¹⁰ In that proceeding, the Globalstar Parties have submitted proposals for sharing the 7 GHz band between NGSO MSS feeder links and BAS through coordination protocols between the co-primary services (BAS, CARS, terrestrial fixed service ("FS"), and NGSO MSS). The Globalstar Parties reaffirm in this docket their support for adoption of frequency coordination protocols for the 7 GHz band. The Globalstar Parties urge the Commission, therefore, to adopt rules in this proceeding that take into account the pending spectrum allocation to NGSO MSS in ET Docket No. 98-142 and to adopt rules requiring mobile BAS/CARS stations operating in the 7 GHz band, especially ATVPUs, to coordinate their mobile operations with nearby NGSO MSS feeder link earth stations.

One band to avoid sharing is 2483.5-2500 MHz. In paragraphs 9 and 17 of the *Notice*, the Commission identifies the TV BAS bands as including 2450-2483.5 MHz band. In paragraphs 20 and 21, however, the Commission lists the BAS bands as including 2450-2500 MHz. Pursuant to NG147, only BAS stations that were licensed or applied for on or before July 25, 1985, may use the 2483.5-2500 MHz band. Because of technology changes,

⁹ *L/Q Licensee, Inc.*, 11 FCC Rcd 16410, ¶ 8 (1996).

¹⁰ *Amendment of Parts 2, 25, and 97 of the Commission's Rules With Regard to the Mobile-Satellite Service Above 1 GHz*, 13 FCC Rcd 17107 (1998) ("Feeder Link NPRM").

presumably few, if any, such stations likely remain operational. Accordingly, to avoid confusion, the Commission should correct its terminology and identify 2450-2483.5 MHz as the band available for BAS.

III. THE COMMISSION SHOULD REQUIRE BAS LICENSEES IN THE 7 GHZ BAND TO PRIOR COORDINATE WITH NGSO MSS EARTH STATION LICENSEES

An issue under consideration in ET Docket No. 98-142 is coordination between NGSO MSS feeder links and airborne TV pickup stations ("ATVPUs") operating in the 7 GHz band.¹¹ In that docket, the Globalstar Parties have explained that fixed NGSO MSS gateway earth stations, operating with 7 GHz feeder links, will not cause interference into mobile ATVPUs, but ATVPUs can cause interference into feeder link earth stations. Interference into NGSO MSS gateways could have an adverse impact on the Globalstar system because there is little redundancy among Globalstar gateway earth stations in North and Central America to compensate for interference events into one gateway. Interference incidents from an AVTPU could cause hundreds, if not thousands, of calls to be dropped and/or blocked.

Interference to NGSO MSS feeder links from 7 GHz ATVPUs and other mobile BAS/CARS stations can be avoided through adoption of standard frequency coordination rules. Such coordination rules need not unduly limit the siting of NGSO MSS feeder link stations, nor unduly restrict the use of mobile BAS pick-up stations or mobile CARS operations. The Globalstar Parties have explained in ET Docket No. 98-142 (1) that relatively few NGSO MSS

¹¹ One of the related issues raised in ET Docket No. 98-142 concerns the use of digital modulation techniques in the 7 GHz band. The Globalstar Parties agree that the use of digital modulation techniques by BAS/CARS licensees will not adversely affect co-primary sharing of the band with NGSO MSS feeder links.

gateways likely are to be deployed in the continental United States¹² and (2) that they (and other NGSO MSS operators) have a strong incentive to avoid urban core areas and other locations with extensive use of the 7 GHz band allocated to FS and BAS.¹³

Moreover, as demonstrated in a Comsearch technical report,¹⁴ ATVPU's operating in the 7 GHz band are utilized primarily in markets where the 2 GHz band is saturated for ATVPU. This occurs generally only in the urban core of the largest metropolitan areas in the U.S. - - the types of areas that NGSO MSS licensees seek to avoid for their gateway earth stations. For example, in the gateway earth station clusters deployed for the Globalstar system in Clifton, Texas, and Puerto Rico, GUSA and its affiliates have successfully coordinated 7GHz earth stations with fixed terrestrial users of the BAS 7 GHz band such as STLs. Moreover, in these relatively remote areas GUSA has not yet experienced interference from mobile BAS or ATVPU operations even in the absence of coordination protocols with BAS/CARS operators.

Because of these factors, co-primary operation by NGSO MSS feeder link gateway stations and BAS would be feasible if standard prior coordination rules would be adopted for the 7 GHz band. ATVPU's already must coordinate with co-frequency terrestrial FS licensees, including the broadcasters' studio links. The Globalstar Parties have proposed an extension of this process to require broadcasters to include NGSO MSS feeder link station operators in their local frequency coordination groups in order to formulate first-in-time coordination protocols

¹² For example, it is not anticipated that another Globalstar gateway will be deployed in the U.S. for several years, with the possible exception of an installation in Alaska and/or the commercial conversion of an existing San Diego test facility.

¹³ See, e.g., *Ex Parte* letter to Magalie Roman Salas, Secretary, FCC from Timothy J. Cooney, counsel to Globalstar USA, Inc., May 14, 2001, ¶ 3-7 ("May 14, 2001, *Ex Parte*").

¹⁴ Comsearch, "Analysis of Globalstar Feeder Link Earth Stations Sharing Spectrum With Airborne TV Pickups," February 16, 2000, submitted as an attachment to letter to Magalie Roman Salas, from Timothy J. Cooney, counsel to GUSA, February 25, 2000 ("Comsearch Report"). The Comsearch Report is submitted as an Attachment to these comments.

among what are proposed to be co-primary users of the 7 GHz band. For example, in the rare occurrence of a broadcaster operating a 7 GHz ATVPU in the vicinity of a Globalstar feeder link gateway, the ATVPU can still operate on the upper two 25 MHz channels available to BAS/CARS at 7075-7125 MHz. The need for broadcasters to operate on those channels to avoid NGSO MSS feeder link earth stations could be learned through the coordination committee.

IV. THE FCC SHOULD REQUIRE PRIOR FREQUENCY COORDINATION IN ALL INSTANCES OF SHORT-TERM OPERATIONS IN SHARED BANDS

Under Section 74.24 of the FCC's Rules, broadcast licensees regulated under Part 73 of the FCC rules (that is, AM, FM, and TV broadcast stations) are authorized to operate a broadcast auxiliary station on a short-term basis, for up to 720 hours per year without prior authorization from the Commission, in order to respond to short-term situations such as a newsworthy event outside of a station's normal operating area.¹⁵ The Commission proposes to extend the scope of the rule to encompass broadcast network entities, cable network entities, and Low Power Television Stations licensees ("LPTV").¹⁶

The Globalstar Parties do not object to the Commission's proposal to expand the scope of Section 74.24 to include broadcast network entities, cable network entities and LPTV, if appropriate precautionary procedures also are implemented. However, expanding the number of entities eligible for such short-term operation makes it essential for the Commission to require prior coordination with existing local coordination committees and/or to appoint special events coordinators. Mobile BAS/CARS and ATVPU's must be required to complete prior coordination procedures with existing FS and satellite users of shared bands (such as NGSO MSS feeder link earth stations) before commencing short-term operations. For example, the GUSA gateway near

¹⁵ 47 C.F.R. § 74.24 (2000).

¹⁶ Notice ¶ 51.

Clifton, Texas, is relatively remote from any urban core area; but, nevertheless, it is possible for newsworthy events to occur nearby. Mobile BAS/CARS stations and ATVPU's can avoid the fixed NGSO MSS gateway earth stations by using other available frequencies (for example, the 2 GHz band used primarily by ATVPU's), but the fixed GUSA earth stations cannot do anything to avoid the ATVPU's or mobile BAS/CARS stations. The Commission's rules, therefore, must expressly require broadcast, cable and LPTV entities to coordinate with the local frequency coordinating committee or the appointed special events coordinator prior to any short-term operations under Section 74.24 so that harmful interference to the relatively few NGSO MSS earth stations nationwide and other BAS stations can be avoided.

The Commission also should clarify the proposed notification/prior coordination procedures for short-term operations under Subsection 74.24(g). As currently proposed, revised Section 74.24(g) would require eligible BAS/CARS licensees merely to "notify" the appropriate frequency coordination committee or any licensees that are assigned the use of the BAS/CARS proposed operating frequency. In theory, such "notification" lawfully could take place one minute before BAS/CARS operations would begin, thereby depriving the affected co-channel licensee any effective input.¹⁷

Moreover, whether or not eligibility to operate under Section 74.24 is expanded, the Commission should delete the exception contained in proposed Section 74.24(g) that "notification" by the BAS licensee is not required "where an unanticipated need for immediate

¹⁷ In modifying Section 74.24, the Commission apparently proposes to delete the existing (but out-dated) cross-reference in subsection (g), whereby BAS licensees may contact the FCC's Auxiliary Services Branch to obtain information on active frequency coordination committees. The Globalstar Parties urge the Commission to retain the cross-reference but to update it to include a website address as well as an updated telephone number. In times of fast-breaking news or scheduled events of significant interest to TV network or cable network entities,

short-term mobile station operation would render compliance with the provisions of this paragraph impractical.” Such an exception should apply at most only to mobile BAS/CARS licensees operating in the 2 GHz band not shared with NGSO MSS. The Commission should revise the proposed language to clarify that the BAS/CARS licensee intending to operate in the 7 GHz band under Section 74.24 is required to both *notify and coordinate* with the appropriate frequency coordinating committee or any co-channel licensee *prior to* commencement of operations *under all circumstances*.

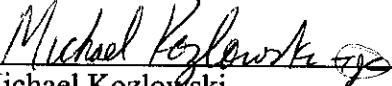
The regulation embodied in Section 74.24(c) requiring the BAS licensee to discontinue the short-term operations upon notification that the BAS licensee *already* is causing harmful interference is not sufficient protection to ensure the integrity of the voice and data traffic being carried through NGSO MSS feeder link gateway earth stations. As mentioned previously, disruption to NGSO MSS gateways may cause hundreds, if not thousands, of voice or data calls to be dropped and/or blocked. This traffic may be conveying information critical to the safety of life or property. To avoid such interference before it occurs (and not simply to cease interference after it is caused and calls already are interrupted), BAS/CARS licensees sharing frequencies with NGSO MSS licensees must be required to complete prior coordination procedures *before* commencing their short-term operations under Section 74.24(g).

distribution of information on local frequency coordinating committees and/or the special event coordinator will be essential.

V. CONCLUSION

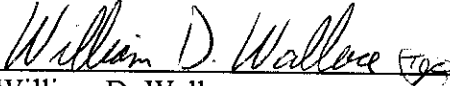
For the foregoing reasons, the Commission should take action consistent with recommendations proposed herein.

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July 9, 2001



COMSEARCH

**Analysis of Globalstar Feederlink Earth Stations
Sharing Spectrum with Airborne TV Pickups**

Frequency Band: 6875-7075 MHz

Report Prepared for Globalstar USA
by
Comsearch

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0.0 Executive Summary

Globalstar USA has requested that Comsearch prepare a report to investigate the viability of spectrum sharing between non-geostationary Mobile Satellite Service (NGSO MSS) feederlink earth stations (FESs) and airborne television pickup (ATVPU) stations operating at 7 GHz in the United States. Comsearch utilized the Society of Broadcast Engineers (SBE) FCC filings and comments, existing FCC licenses, available technical literature, and information gathered from local broadcast engineers to determine a usage profile of airborne TV pickups. Comsearch also researched the licensing and coordination process for the Broadcast Auxiliary Services (BAS) airborne systems to determine how frequencies were allocated among the 7 GHz users.

While the usage study is by no means comprehensive, the results of this study indicate that the majority of ATVPU operations are in the 2 GHz band. Furthermore, in light of the limited current ATVPU usage of the 7 GHz band, the scope of the SBE's exclusion zone (100 kilometers from the top 100 TV markets) may not be consistent with the FCC policies favoring efficient use of the available spectrum. The SBE's proposed exclusion zones would preclude deployment of FES gateways in large areas of the United States. This preclusion would arise without any evidence that ATVPU's in those areas currently operate in the 7 GHz band, are proposed to operate in the 7 GHz band, or could not share 7 GHz frequencies with the FESs.

In our view, it would be more spectrally efficient if, instead of exclusion zones, coordination protocols would be established among 7 GHz users as an appropriate response to the interference concerns presented. In order to facilitate co-primary uses in the 7 GHz band, a separation distance between users may be required in certain instances, but these instances should be reciprocal and coordinated on a case-by-case basis. The extent of the separation distance can be determined by factors such as terrain, earth station discrimination angles, and other criteria.

1.0 Introduction

The Society of Broadcast Engineers (SBE), which represents BAS users in the 7 GHz band, has submitted comments on the FCC's Notice of Proposed Rulemaking in ET Docket No. 98-142 in which the SBE proposes policies that would restrict the operational flexibility and reliability of Mobile Satellite Service (MSS) operators. In particular, the SBE has petitioned the FCC to rule on the licensing of FESs in the presence of airborne TV pickups. A study examining the usage of ATVPU in the band and approaches to coordination between them and FESs is therefore required. This study considers the dynamic geometry and operational characteristics of mobile TV pickup stations and provides a preliminary analysis of the potential impact of TV pickups on NGSO MSS feederlink earth stations.

Specifically, this report provides the following information:

- How ATVPU are licensed.
- The number of ATVPU licensed with nationwide or regional authorization.
- The allocated frequency bands.
- The spectrum allocation within each band.
- The current inter-system interference analysis process.
- The types of antennas and equipment used by ATVPU.
- Flexibility in channel usage.
- Options to use frequency bands other than those allocated to MSS feederlink earth stations, (6700 – 7075 MHz).
- Link performance requirements.
- Interference criteria for feederlink earth stations.
- Calculation of separation distances between NGSO MSS Feederlink Earth Stations and ATVPU in the 7 GHz band.

2.0 Analysis Results

One of the objectives of this study was to review the SBE comments and consider its proposal for a 100-kilometer exclusion zone around the major television markets. After researching the characteristics of ATVPU's and performing interference calculations, Comsearch has determined the following information and results.

- How ATVPU's are licensed.

Typically, a broadcaster is granted a license to operate TV pickup equipment, which has been type-accepted by the FCC and FAA (for airborne use), by filing a FCC Form 313. These licenses can act as blanket authorization to operate a number of remote TV pickups, including ATVPU's. When additional TV pickup systems are developed they can also operate under the same original blanket license. Thus, the FCC records do not indicate precisely how many remote TV pickups are actually operating. The FCC does not assign specific frequency channels to a broadcaster and the broadcaster must instead contact the appropriate regional frequency coordinator to be assigned a TV pickup frequency channel and to coordinate use.

- The number of TV pickups licensed with nationwide or regional authorization.

A query of the FCC Universal Licensing System (ULS) database showed 790 TV pickup licenses nationwide in the 6875 – 7075 MHz frequency range. Additional queries were done for other BAS frequency bands and the results are summarized below:

2 GHz:	1846 licenses
6.5 GHz:	78 licenses
13 GHz:	755 licenses
40 GHz:	17 licenses

These licenses can act as a blanket authorization for a number of TV pickup systems, operating in any band allocated for TV pickups. The FCC has indicated that the number of licenses shown for TV pickups may be low by a factor of two or three. The number of ATVPU's is also not easily determined using the FCC ULS database. The FCC has not been very rigorous when it comes to requiring BAS licensees to update their remote TV pickup licenses. Nevertheless, the data indicates that it is reasonable to assume that there are over twice as many TV pickup licenses in the 2 GHz band as in the 7 GHz band. According to the SBE, TV pickups with nationwide operating authority do exist for TV Network and Cable Network entities, but we have not been able to confirm this. In summary, the available information on the population and frequency usage of ATVPU's does not support the SBE's proposal for widespread 7 GHz exclusion zones.

The use of ATVPU's is prevalent in certain metropolitan areas such as Los Angeles or New

York, whereas Washington DC has only one station with a helicopter-based unit, and its usage is somewhat restricted because of flight zone restrictions. It should be noted that 7 GHz is also used for other airborne transmitters, such as blimps for sporting events.

It is important to note that the use of the 7 GHz band for airborne systems is not preferred because of the many fixed links (Studio Transmitter Links (STLs) and Inter-City Relays (ICRs)) in the band. The 2 GHz band is mainly used for remote, mobile, temporary, and airborne transmissions because of the favorable propagation characteristics and small number of fixed links in the band. Our limited survey of equipment manufacturers indicates that most ATVPU's use 2 GHz channels, rather than 7 GHz channels.

- The allocated frequency bands.

TV pickups may operate in the 2, 6.5, 7, 13, and 40 GHz frequency bands.

- The spectrum allocation within each band.

2 GHz:	1990 – 2110 MHz	(Seven analog channels with 17-18 MHz bandwidth)
6.5 GHz:	6425 – 6525 MHz	(Four channels with 25 MHz bandwidth; Bandwidths of 1 MHz and 8 MHz are also allowed)
7 GHz:	6875 – 7125 MHz	(Ten channels with 25 MHz bandwidth)
13 GHz:	12.7 – 13.25 GHz	(Twenty-two channels with 25 MHz bandwidth)
40 GHz:	38.6 – 40 GHz	(Allocation on a secondary basis to fixed links with no channel boundaries specified)

- The current inter-system interference analysis process.

Individual users of the 7 GHz band must coordinate amongst other in-band users to preclude interference. The current process is an ad hoc agreement on frequency allocations. The local broadcasters convene on a monthly, weekly, or as necessary basis, to discuss interference and coordination issues. Typically, a local broadcaster will be informally assigned a primary and backup channel in each band. As spectrum allows, network broadcasters may be assigned spectrum in a similar manner. In areas where many users exist the local broadcasters may be assigned to the 2 GHz band and the networks to the 7 GHz band. Attached in Appendix A is an example of the band allocation for the 2 and 7 GHz band for the Washington, DC area. As can be seen, the local entities are predominantly in the 2 GHz band and the networks in the 7 GHz band.

Some of the operational scenarios for ATVPU's include using a signal tracking directional antenna, a geographical position tracking antenna, or a broadbeam antenna system. The first

such scenario may use the 7 GHz band for only one direction of the route; the ATVPU transmits to the fixed receiver and receives a tracking beacon signal in the 2 GHz band, or vice versa. There are not many tracking receiver sites because they require a gyroscopic tracking system, which is expensive to build. Also found in this band are tracking systems using Global Positioning System (GPS) based coordinates of the fixed receiver. Many ATVPU communicate to established fixed receiver sites around a metropolitan area. In certain circumstances, though, it may be necessary to have an ATVPU transmit to another remote Electronic News Gathering (ENG) truck, which would be positioned in a convenient location.

- The types of antennas and equipment used by TV pickup stations.

Comsearch's research into the types of antennas and equipment used by TV pickup stations yielded data from three manufacturers. This information can be found in Appendix B, which contains data downloaded from the Wescam, Adaptive Broadband (previously Microwave Radio Communications), and Global Microwave Systems web-sites.

- Flexibility in channel usage.

As mentioned previously, most of the manufacturers that Comsearch contacted indicated that the majority of airborne systems are at 2 GHz, although some operate at 7 GHz. Most of the currently available equipment is frequency agile and can be easily changed to another in-band channel. If necessary, an ATVPU could switch to another transmit channel in the same band.

For example, an ATVPU operating in the 7 GHz band could switch to one of the two upper 7 GHz channels (7075 – 7125 MHz) which are outside of the band proposed to be allocated for MSS feederlink operations. Switching to another band altogether would require significant modification to the airborne and fixed receive systems.

- Options to use frequency bands other than those allocated to MSS feederlink earth stations, (6700 – 7075 MHz).

The two upper 7 GHz channels allocated to BAS (7075 – 7125 MHz) lie outside the band proposed for MSS feeder link operations. TV pickups can also be used in the 2, 6.5, 13, and 40 GHz bands. The 40 GHz band is currently not in use. The 13 GHz band has severe path length restrictions and is not commonly used for TV pickups; mostly it is used for "window shots" of very short length. Again, most TV pickups, including ATVPU, prefer the 2 GHz band.

- Link performance requirements.

Based upon existing usage in the 7 GHz band, typical ATVPU links require a carrier level between -40 dBm and -70 dBm. The calculations for interference into the FES's were performed using directional antennas (ITU-R F.699 and FCC Standard B) and omni-

directional antennas on the ATVPU station.

- Interference Criteria for feederlink earth stations.

Long-Term: -153 dBW/MHz @ 20%
Short-Term: -143 dBW/MHz @ 0.01%

These levels are the maximum tolerable interference values for feederlink earth stations, when sharing with ATVPU, when referenced at the receive antenna system output port.

- Calculation of separation distances between NGSO MSS Feederlink Earth Stations and ATVPU in the 7 GHz band.

Background

A rough analysis was performed to examine separation distances allowing for successful uninterrupted operation of MSS Feederlink Earth Stations, operating their downlink receivers in the 7 GHz BAS band, in the presence of ATVPU that are not required to coordinate. Although this study is not comprehensive, it does provide an indication of the interference potential to MSS gateways from ATVPU. The calculations were performed utilizing typical operational parameters for the ATVPU as determined from information gathered from equipment manufacturers, FCC licenses, and SBE engineers. Currently, all links considered in the analysis are analog FM-TV links. The parameters for the FES were taken from material provided by Globalstar USA.

Modeling Assumptions

The ATVPU parameters and FES parameters are summarized below.

ATVPU Parameters (can vary over a wide range):

Antenna Size:	1 to 2 m
Antenna Gain @ 7 GHz:	13.0 to >38.0 dB
Antenna Centerline:	100 to >1000 m
System Modulation:	Analog
Bandwidth:	25 MHz
Transmitter Output Power:	3 to 10 Watts
Feeder Loss:	5 to 10 dB
Antenna Sidelobe Characteristics:	ITU-R F.699 FCC Standard B Omni-directional

FES Parameters:

Antenna Size:	5.5 m
Antenna Gain @ 7 GHz:	50.2 dBi
½ Antenna Beam Width @ 3/15 dB points:	0.5°/0.99°
Antenna Centerline:	4.61 m
Antenna Sidelobe Characteristics:	32 – 25log(Θ)
Minimum Elevation Angle:	10°
Maximum Elevation Angle:	90°
System Receiver Frequency:	6925 MHz
Receive System Noise Temperature:	190°
Interference Threshold Long-Term:	-153.0 dBW/MHz
Interference Threshold Short-Term:	-143.0 dBW/MHz

The interference thresholds were calculated using the system noise temperature and were derived from ITU Recommendation SF.1006, Equation 3 for $P_1 = 20\%$ (Long-Term) and Equation 4 for $P_2 = 0.0025\%$ (Short-Term). The indicated thresholds are the maximum tolerable interference values for feederlink earth stations, when sharing with ATVPU, when referenced at the receive antenna system output port.

Modeling Constraints

This analysis is a simplified approach to calculating separation zones. The operations of both the FES and ATVPU involve motion: the FES tracking the moving non-geostationary (NGSO) satellites and the ATVPU in motion over its area of operation. This motion leads to a time varying antenna gain. In order to take this phenomenon into account, the FES horizon gain for all azimuths has been determined by either Globalstar USA statistics based upon the horizon gain exceeded for 10 percent of the time or the Time Invariant Gain (TIG) method, whichever is more conservative. Both methods are described in ITU-R IS.849-1. Furthermore, in order to take the temporal and transitory nature of the ATVPU into account, the short-term interference objective has been used as the maximum permissible level of interference allowed. These two assumptions will accommodate the mobile and varying nature of these two services to some degree, and the analysis as a whole was made conservative due to the fact that worst case horizon gains and relative discrimination angles between the two services have been considered.

Calculation Approach

The calculation approach uses Comsearch's standard coordination procedures. All calculations considered a large range of parametric values so that the levels of the interference results can be evaluated with respect to the parameters.

Propagation Model Assumptions:

- Free space loss for line of sight conditions; modified as appropriate by over-the-horizon considerations for greater distances
- ATVPU antenna centerline height of 100 or 1000 meters above ground elevation of Gateway antennas
- Minimum separation distance of 1 kilometer
- Maximum separation distance of 100 kilometers
- Frequency of operation is 6925 MHz; Wavelength of 4.3 cm
- ATVPU transmitter output power of 3 watts
- Gateway antenna at minimum elevation angle
- No consideration given for terrain blockage

Calculation Results

For successful operation of FES gateways in the event that ATVPU's are not required to coordinate, the separation distances needed for various ATVPU antenna types at heights from 100 to 1000 meters range from 10 km to 100 km. These estimates include a 20 dB shielding factor when the ES elevation (off-pointing) discrimination angle is greater than 0 degrees (i.e. the ATVPU is at a position lower than the minimum elevation angle of 10 degrees).

Examples of these calculations are summarized below.

Omni-directional (100 meter height)

Separation Distance (km)	Required ATVPU-ES Azimuth Discrimination Angle (No Shielding)	Required ATVPU-ES Azimuth Discrimination Angle (20 dB Shielding Factor)
1	Does not clear for any discrimination angle	Does not clear for any discrimination angle
10	Does not clear for any discrimination angle	Does not clear for any discrimination angle
25	Does not clear for any discrimination angle	Does not clear for any discrimination angle
50	Does not clear for any discrimination angle	Clears for all discrimination angles
100	Does not clear for any discrimination angle	Clears for all discrimination angles

These calculations indicate the separation distances needed for successful operation of FES gateways, in the event that ATVPU's are not required to coordinate, for omni-directional ATVPU antennas operating at a height of 100 meters. Included is a 20 dB shielding factor when the ES elevation (off-pointing) discrimination angle is greater than 0 degrees (i.e. the ATVPU is at a position lower than the minimum elevation angle of 10 degrees).

ITU-R F.699, 2-meter diameter (1000 meter height)

Separation Distance (km)	Required ATVPU-ES Azimuth Discrimination Angle (No Shielding)	Required ATVPU-ES Azimuth Discrimination Angle (20 dB Shielding Factor)
1	Does not clear for any discrimination angle	N/A
10	Does not clear for any discrimination angle	30 degree minimum discrimination angle
25	Does not clear for any discrimination angle	15 degree minimum discrimination angle
50	40 degree minimum discrimination angle	10 degree minimum discrimination angle
100	30 degree minimum discrimination angle	5 degree minimum discrimination angle

These calculations indicate the separation distances and orientation discrimination angles needed for successful operation of FES gateways, in the event that ATVPU's are not required to coordinate, for 2-meter diameter directional ATVPU antennas operating at a height of 1000 meters. Included is a 20 dB shielding factor when the ES elevation (off-pointing) discrimination angle is greater than 0 degrees (i.e. the ATVPU is at a position lower than the minimum elevation angle of 10 degrees).

3.0 Summary and Conclusions

- If ATVPU's are not required to coordinate to avoid the frequencies utilized by 7 GHz FES gateways, our findings indicate that a reciprocal separation distance (between ATVPU's and a FES) of as much as 100 km may be justified under certain circumstances. The data surveyed, however, does not seem to justify the SBE recommendation for 100 kilometer exclusion zones around the top 100 markets because the deployment of ATVPU's at 7 GHz does not seem to be very prevalent at this time. Moreover, the relatively few ATVPU's that operate in the 7 GHz band have the ability to switch to the two upper channels (7075 – 7125 MHz) which lie outside the band proposed for allocation to MSS feederlink earth stations. The main band for ATVPU's is 2 GHz for most markets. Some markets, such as Washington, DC, do not have significant ATVPU usage in any band.
- In order to provide protection to the FES, a bilateral coordination process must be instituted. This process would ensure the successful operation of a licensed FES facility and allow for the BAS community to continue to add fixed links in the 7 GHz band. An effective sharing scenario would be to have the MSS licensee work with the local broadcast community in the area(s) where the FES is to be licensed and to determine if interference from ATVPU's will be a significant problem. In those areas where there is already significant 7 GHz ATVPU usage, the FES should be located at an appropriate separation distance. In those areas where there is no 7 GHz usage, the FES should be placed in an area free from interference from existing fixed links and should be accorded first-in-time priority over ATVPU's utilizing the 7 GHz band. The BAS community should ensure long-term protection for the FES by avoiding the 7 GHz band for ATVPU's in the proximity of this FES.
- In those instances where ATVPU's may be required in an area near an installed FES, an interference analysis and coordination process should be followed to exchange technical data and assure both parties that the operation of the ATVPU will not cause interference. Since the number of FES facilities is limited, it is recommended that the MSS licensee participate in the local SBE coordination meetings and that the local broadcasters be required to exchange their relevant coordination data with any local MSS licensee.



Appendix A
Channel Plan for Washington, DC

Washington Area

W.E.B.E. Broadcast Microwave Frequency Coordination

Effective date: May 1, 1988

2Ghz Prevailing Pattern of Use

Ch 1	*WRC*	/	(NBC)
Ch 2	*WUSA*	/	(CBS)
Ch 3	*WJLA*	/	(ABC)
Ch 4	*WTTG*	/	(Fox), (C-Span)
Ch 5	*CNN*	/	(Gannett), (WUSA)
Ch 6			(NBC), (ABC), (WJLA), (WRC), (Others)
Ch 7			(CBS) (Gannett) (CNN) (WTTG) (WNVC-RPU) (Others)

7Ghz Prevailing Pattern of Use

Ch 1	-----	ICR USE	-----
Ch 2	*NBC*	/	(WRC)
Ch 3	*CBS*	/	(WUSA)
Ch 4	*Group W*	/	(H.T.S)
Ch 5	(WUSA)	/	(Others)
Ch 6	(WRC)	/	(Others)
Ch 7	*ABC*	/	(WJLA)
Ch 8	*Gannett*	/	(WTTG)
Ch 9	(WJLA)	/	(Others)
Ch 10	-----	ICR USE	-----

* INDICATES PRIMARY USER ON THAT CHANNEL. () INDICATES SECONDARY USER
No organization "owns" a channel outright. No organization has more
than one primary channel.

Appendix B

Manufacturer Information

WESCAM ROCK SOLID • WORLDWIDE	Corporate Information	Customer Service	Image Café	Search...
	Home Contact Wescam External Links			

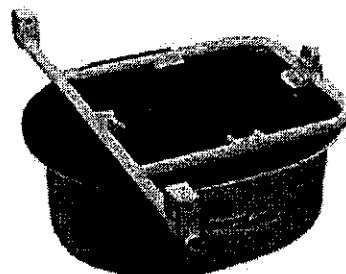
[Micro Data Systems](#) [Stabilized Cameras](#) [Aerial Systems](#)
[Radar](#) [Ground Surveillance](#) [SmartLink](#)

[Skypod V](#) [Skypod LC](#) [OMN-ADU](#) [PRO-300](#) [ULT-160](#) [HemiTrack](#) [TrollTrack](#)

model


Skypod V

- Externally mounted antenna pod
- Universal Installation Interface
- Fully Integrated Microwave transmitter & receiver
- Three antennas (highgain, downlink, OMNI)
- Optimum signal quality
- Easy to use



The SKYPOD V™ airborne microwave system is the next generation of long range airborne video microwave transmission and relay systems from Wescam, providing reliable, continuous, high quality video and audio signals in real time to fixed or mobile ground receive sites. The system includes an externally mounted antenna pod integrated with its own microwave transmitter, receiver, channel filter and up to three separate antennas: an autotracking directional high gain antenna (using GPS and aircraft heading sensors for tracking control), an omnidirectional antenna and a downlooking antenna. This configuration provides maximum operational flexibility while still maintaining optimum signal quality for superior image transmission. Antenna selection is performed remotely from the operator position inside the aircraft. Each antenna can be configured for simplex or duplex operation, allowing the system to also be operated as an airborne microwave repeater.

Profile Typical Applications click to view Typical Installation click to view		
	Electronic News Gathering	Command & Control
	Bell 206	Bell 206
	AS350	Bell 206
	Bell 206	Bell 206

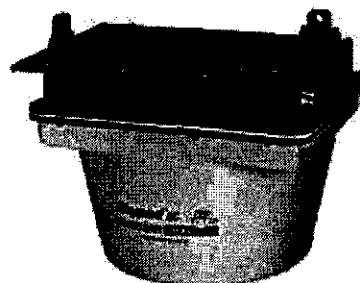
	Home	Contact Wescam	External Links
	Corporate Information	Customer Service	Image Café

[Skypod V](#)
[Skypod LC](#)
[OMN-ADU](#)
[PRO-300](#)
[ULT-160](#)
[HemiTrack](#)
[TrollTrack](#)

model

Skypod LC

- Externally mounted antenna pod
- Universal Installation Interface
- Fully integrated Microwave transmitter
- Single directional antenna (high gain)
- Optimum signal quality
- Easy to use



The Skypod-LC is an airborne microwave video transmission system designed for applications where the performance and range of a tracking, high gain, directional antenna is needed but size, weight, or budget allowances do not permit the installation of a Skypod V system. Ideally configured for law enforcement applications, it is equally suited to broadcast systems not requiring the full range or airborne repeater capabilities of a Skypod V. The system includes an externally mounted antenna pod integrated with its own microwave transmitter, and a single, directional high gain antenna. The system uses GPS and aircraft heading sensors for tracking control. Navtrack is optional.

Profile

Typical Applications
(click to view)



Airborne Law Enforcement

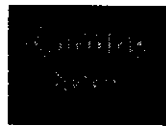


Electronic News Gathering

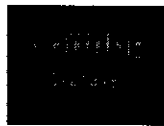


Command & Control

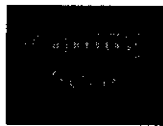
Typical Installation
(click to view)



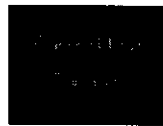
Skypod LC



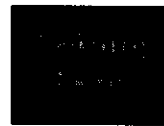
Skypod LC



Skypod LC



Skypod LC



Skypod LC

System Configuration

Coming Soon

To request detailed product specifications click here...



WESCAM ROCK SOLID . WORLDWIDE	Corporate Information	Home	Contact Wescam	External Links
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[Skypod V](#)
[Skypod LC](#)
[OMN-ADU](#)
[PRO-300](#)
[ULT-160](#)
[HemiTrack](#)
[TrollTrack](#)

model	OMN-ADU
-------	----------------

- Deployable Antenna
- Rugged, Lightweight
- Integrated Transmitter
- Failsafe features
- Easy operation
- SmartLink Interface



The OMN-ADU Airborne Microwave System is a low cost, rugged, lightweight microwave transmission system for reliable, continuous, high quality video and audio signals from airborne cameras. The system includes an externally mounted pod with an omni-directional antenna mounted at the end of a deployment arm mechanism. The microwave transmitter is integrated into the pod to minimize signal losses and to allow the option of having several OMN-ADU pods covering different frequency bands that can be quickly installed as required. A wide range of frequency and power options is available. Also included are such fail-safe features as a breakaway link in the deployment arm, redundant deploy and stow indicators, automatic self test and auto-stow on failure detection.

This system is readily upgraded to include the NavTrack option, which transmits aircraft position to NavTrack equipped autotracking receive antennas. Upgrading to the longer range Skypod V and Skypod LC is also easy, since the cable, connector and controls are standard for all Wescam antenna pods.

Profile			
Typical Applications (click to view)			
	Electronic News Gathering	Command & Control	
Typical Installations (click to view)			
	Bell 412	Bell 412	Fixed wing

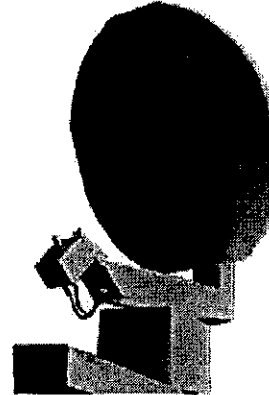
WESCAM ROCK SOLID • WORLDWIDE	Corporate Information	Customer Service	Image Cafe	Search...
MICRO-IMP EXACTUS TROLLTRACK HEMI-TRACK OMN-ADU PRO-300 ULT-160 SKYPOD NAVTRACK				

[Skypod V](#) [Skypod LC](#) [OMN-ADU](#) [PRO-300](#) [ULT-160](#) [HemiTrack](#) [TrollTrack](#)

model

PRO-300



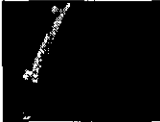
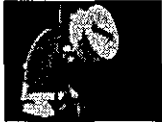
- Long Range Microwave Receive System
- Single or Multiple Radio Frequency Bands
- High Quality Video, Audio
- NavTrack™ AutoTracking Antenna
- Local, Remote, and Networked Control Systems
- TouchStar™ Graphic Interface



In use by most of the biggest names in broadcasting in the U.S. and abroad, the PRO-300 has become the industry standard in long range, microwave receive systems for reliable, continuous, high quality reception of video and audio transmissions. The antenna is typically installed on a tower or rooftop at a location selected for best continuous line-of-sight coverage to the potential transmitting sites (terrestrial and / or airborne). The equipment rack containing the microwave receiver and controller can be located up to 1,500 feet away, and the control location can be situated just about anywhere to which video, audio and data links can be established.

The system components are all 19-inch rack mounted units. They include a microwave receiver, a Slave Controller (the TS-940SL), which interfaces with the antenna and the microwave receiver. A TouchStar Master Controller is the primary operator interface for antenna, receiver and tracking control, and is included as necessary. (TouchStar systems can control more than one receive site. It is not necessary, therefore, to purchase one for every remote) Other typical options include a color video monitor, and VTR.

Related TouchStar options now available include integrated searchable maps (dependant on location), networked Master Controllers, on screen Real Time Video window, remote access modems enabling a remote diagnostics capability, integrated single or multiple ground camera control, and remote switcher control.

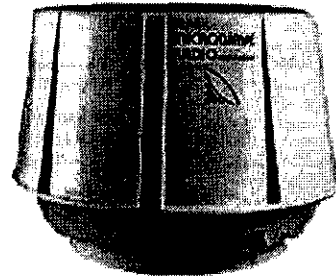
Profile Typical Applications (click to view) Typical Installations (click to view)		
	Electronic News Gathering	Command & Control
		
	Rooftop	Rooftop with relay

 WESCAM ROCK SOLID • WORLDWIDE	Corporate Information	Customer Service	Image Café	Search...
	All-Company News Specialized Camera Thermal Systems	Extreme Camera Cameras Search Link		

Skypod V Skypod LC OMN-ADU PRO-300 ULT-160 HemiTrack TrollTrack

model	ULT-160
-------	---------

- Medium Range Microwave Receive System
- Single or Multiple Radio Frequency Bands
- High Quality Video, Audio
- NavTrack™ Antenna Steering
- Local, Remote, and Networked Control Systems
- TouchStar™ Graphic Interface
- Low wind loading



In use by most of the biggest names in broadcasting in the U.S. and abroad, the ULT-160 has become the industry standard in medium range, microwave receive systems for reliable, continuous, high quality reception of video and audio transmissions. The antenna is typically installed on a tower or rooftop at a location selected for best continuous line-of-sight coverage to the potential transmitting sites (terrestrial and / or airborne). The equipment rack containing the microwave receiver and controller can be located up to 1,500 feet away, and the control location can be situated just about anywhere to which video, audio and data links can be established.

The system components are all 19-inch rack mounted units. They include a microwave receiver, a Slave Controller (the TS-940SL), which interfaces with the antenna and the microwave receiver. A TouchStar Master Controller is the primary operator interface for antenna, receiver and tracking control, and is included as necessary. (TouchStar systems can control more than one receive site. It is not necessary, therefore, to purchase one for every remote) Other typical options include a color video monitor, and VTR.

Related TouchStar options now available include integrated searchable maps (dependent on location), networked Master Controllers, on screen Real Time Video window, remote access modems enabling a remote diagnostics capability, integrated single or multiple ground camera control, and remote switcher control.

Profile

Typo	ca
App	ca 100
Off	ca 75



Electronic News Gathering



Command & Control

Typical
installations
click to view



Rooftop



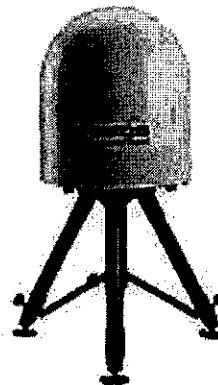
Rooftop

WESCAM ROCK SOLID WORLDWIDE	Corporate Information	Customer Service	Home	Contact Wescam	External Links	Image Cafe	Search...
Microwave Systems Stabilized Cameras Control Systems							
Rentals Training Courses Specials							
Skypod V Skypod LC OMN-ADU PRO-300 ULT-160 Hemi Track TrollTrack							

model







Hemi Track

- Mobile microwave system for video, voice, or data
- Compact, lightweight
- Integrated microwave receiver
- Navtrack Automatic Antenna Steering
- Simple, modular control system
- Optional transmit capability
- Available in Van Mounted applications



The new HemiTrack™ series of products from Wescam begins a new era in real-time image acquisition and transmission. The system may be used either to manually receive from a stationary transmitter, or to continuously Navtrack a mobile source such as a helicopter, airplane, or a ground vehicle. HemiTrack™ delivers broadcast-quality video and audio. The HemiTrack control system is designed to be intuitive, and requires no special operator training or hands-on effort. HemiTrack™ systems, typically used as receive only, may also be configured as transmit only, or transmit and receive in frequency ranges from 1.7 to 7 Ghz. Best of all, these systems are based on commercial satellite and avionics technologies. With Wescam's field proven Navtrack system and processing expertise, you get the most reliable and economical solution available.

HemiTrack™ is an ideal choice for deployable video needs in Electronic Newsgathering (ENG), Sports Broadcasting, Airborne Law Enforcement (ALE), surveillance, maritime patrol, tactical security, or anywhere professionals need real-time decision support information.

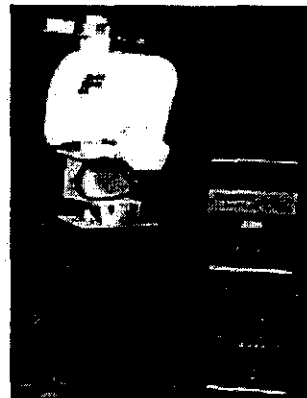
Profile Typical Applications click to view Typical Installation click to view	 Command & Control	 Electronic News Gathering	 Airborne Law Enforcement
	 All terrain Vehicle	 Van	 Tripod

WESCAM ROCK SOLID • WORLDWIDE	Corporate Information	Home	Contact Wescam	External Links
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model **Trolltrack**

- Eliminate tedious or near-impossible alignment and automate the link between mobile vehicles and airborne systems
- TrollTrack may be supplied with a variety of video management options, and with portable tripod or vehicular mounts

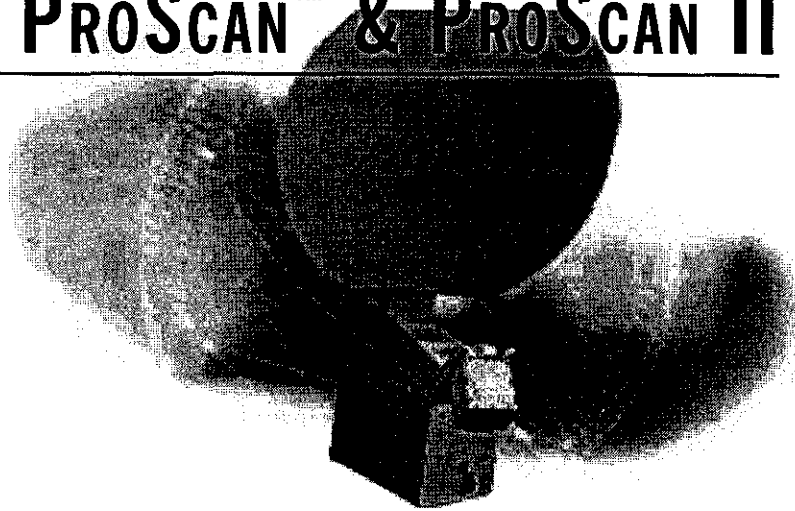


When a story is hot and time is critical, you don't have the time for tedious or near-impossible alignment of antennas to link your roving news vans or SNG trucks with airborne systems. Wescam's exclusive TrollTrack system provides you with a fast, automatic way to acquire and track your airborne signal from a portable site, ensuring maximum signal strength for best possible picture integrity. This self-calibrating system provides the ease of use and the reliability necessary for real-time coverage when you really need it.

TrollTrack incorporates a complete microwave receiver and antenna system, an integrated GPS navigational system, a three-axis solid-state magnetometer, Wescam's hardy TS-1480 master and TS-940SL slave controller, as well as optional video management systems. TrollTrack uses NavTrack telemetry data from the airborne source to automatically acquire and then hold onto the signal. The tripod mounted antenna can be set up in almost any orientation and will automatically self-calibrate when commanded to do so. TrollTrack systems are available in versions to cover the 1.7 GHz to 7 GHz bands, and special versions covering up to 15 GHz are currently in development.

Profile					
Typical Applications Click to view					
	Command & Control				
Typical Installations Click to view					

MRC™ ProScan™ & ProScan II



MAIN FEATURES

- 1.4 meter CSC² eliminates requirements for elevation travel in most applications
- High strength, lightweight honeycomb construction
- Broadband design covers 2/2.5, 6.4/7, and 13 GHz
- Right circular, left circular, horizontal and vertical polarization

ROTATOR

- Ruggedized rotating mechanism
- Dual speed
- Built-in surge suppression
- All external metal parts are aluminum with stainless steel hardware
- Continuous rotation option

LNA/BLOCK DOWNCONVERTER

- 26 dB gain LNA (2 GHz)
- 6.4/7 GHz block downconverter (used with dual-band system)
- 6.4/7 and 13 GHz block downconverter (for triband system)

PROSCAN II OPTION

- Newly designed solid-state switching feed
- New high dynamic range LNA and bandpass filter to combat PCS interference.

The MRC ProScan is a highly ruggedized offset fed antenna incorporating a downward looking cosecant squared reflector, thus eliminating the requirement for elevation travel in most applications. The offset feed design allows greater feed efficiencies and reduced sidelobes.

The feed is broadband covering the 2/2.5 GHz range. A dual-band antenna system is available covering both the 2/2.5 GHz and 6.4/7 GHz bands and a triband system is also available covering 12.7 to 13.2 GHz, in addition to 2 GHz and 7 GHz. The feed design permits a full range of remote switching options with the LNA/block downconverter internal to the feed to minimize signal loss through cables.

The dual-speed rotator is enclosed in a ruggedized welded housing with hinged doors on 2 sides for ease of access. It has been designed using proven technology for reliability. It comes equipped with a coaxial rotary joint to minimize RF cable failures. Lightning and surge suppression is provided within the MRC ProScan. The rotator and enclosure are constructed of aluminum and stainless steel; no steel is used on external parts thus eliminating the possibility of corrosion. Continuous rotation is available as a system option.

The MRC ProScan II central receive antenna features a newly designed solid-state switched feed. The feed offers improved reliability through the elimination of all electro-mechanical coaxial switches. The switching is performed through the latest in solid-state microwave technology. This design also reduces the DC operating power of the feed. The MRC ProScan II also features a new bandpass filter and high dynamic range LNA design. This design was initiated to combat the interference issues which have become common-place with the introduction of PCS systems. The combination of a high dynamic range LNA and sharper filtering make the MRC ProScan II a "bullet-proof" solution to the PCS problem.



MRC ProScan CENTRAL RECEIVE ANTENNA SPECIFICATIONS

RF

Model:	2 GHz	7 GHz	13 GHz
Frequency Range (GHz):	2.0 – 2.5	6.4 – 7.1	12.7 – 13.2
Gain*:	26 dBi	36 dBi	41 dBi
1st Sidelobe Attenuation:	28 dBi max	19.5 dBi max	19.5 dBi max

* Gain is for basic antenna net of switching options.

BEAMWIDTH

	2 GHz	7 GHz	13 GHz
Azimuth			
P+HPBW	7.6°	2.4°	1.5°
Elevation			
HPBW:	7.2° to CSC°	3.8° to CSC°	1.8° to CSC°

REFLECTOR

Type:	Cosecant squared (CSC²) reflector:
Construction:	High-strength, lightweight honeycomb
Polarization:	LCP, RCP, horizontal, and vertical

FEED

Configurations: 2 GHz broadband or 2/7 GHz dual-band
 Broadband: 2/2.5, 6.4/7, and 13 GHz
 LNA: Built in 26 dB gain LNA
 Dual Band: Optional 6.4/7 GHz block downconverter
 Triband: Optional 6 and 13 GHz block downconverter

ROTATOR

Dual Speed:	Slow: 3°/second Fast: 15°/second
Backlash:	+0.2°
Maximum Wind Load:	125 mph operating
Rotation:	360°, -5°overlap

ENVIRONMENTAL

Temperature Range: -30°C to +60°C

PHYSICAL

Reflector Size: 54" (1.4 meter) dia.
 System Weight: 250 lbs (114 kg) max

ORDERING INFORMATION

ProScan ANTENNA SYSTEMS

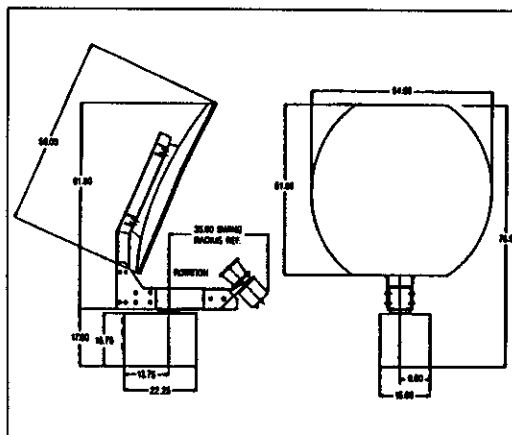
901140-1 2 GHz ProScan without local control
 901140-2 2/7 GHz ProScan without local control

ProScan II ANTENNA SYSTEMS

PROII-2 2 GHz ProScan II with solid-state feed
 PROII-7 7 GHz ProScan II with solid-state feed
 PROII-27 2/7 GHz simultaneous ProScan II with solid-state Feed
 PROII-2713 2/7/13 GHz simultaneous ProScan II with solid-state Feed

ProScan OPTIONS

CRO-PRO Continuous Rotation Option
 901594-1 Radome, unheated
 842746-2 ProScan control cable and connectors (specify length in feet)
 902864 LNA Bypass Option
 52700-50 Band Filter (1.99 to 2.110 GHz)
 902815-1 2 – 2.5 GHz Band Filter
 901586-1 High Gain Linear Amp, 30 dB, DC without bypass
 901586-2 High Gain Linear Amp, 30 dB, DC with bypass



MRC ProScan ANTENNA

Product dimensions in inches

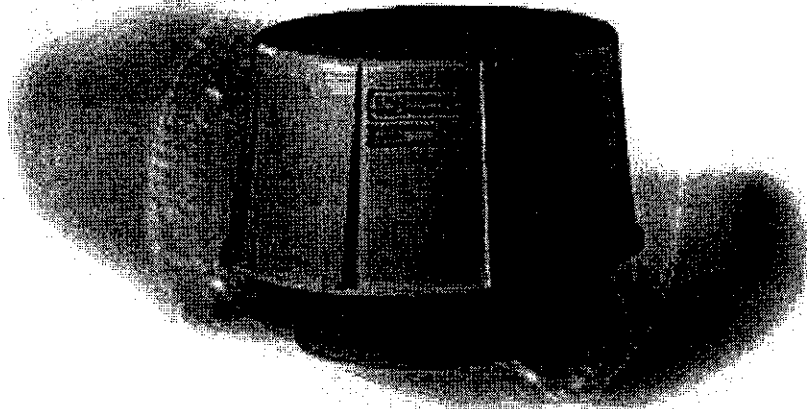


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 North Billerica, MA 01862 USA
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 E-MAIL: mrc@adaptivebroadband.com
 WEB SITE: <http://www.adaptivebroadband.com>

Adaptive Broadband products are manufactured under a quality system certified to ISO 9001. Adaptive Broadband reserves the right to make changes to specifications of products described in this data sheet at any time without notice and without obligation to notify any person of such changes.

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MRC™ ULTRAScan™ & ULTRAScan II



MAIN FEATURES

- All solid state switching:
no RF electro-mechanical switches
- Low noise amplifier and filter integrated into feed
- Low profile
- Lightweight
- Broadband design:
 - Wideband, 2/2.5 GHz
 - Optional dualband, 2/7 GHz
 - Optional triband 2/7/13 GHz
- Right circular, left circular, horizontal,
and vertical polarization

ROTATOR

- Ruggedized rotating mechanism
- Dual speed
- Easily removed top radome for ease of access
- Build-in surge suppression
- All external metal parts are aluminum with
stainless steel hardware

LNA/BLOCK DOWNCONVERTER

- 26 dB gain LNA
- 6.4/7 and 13 GHz block downconverter
(used with dual-band and triband systems)

ULTRAScan II OPTION

- New, improved low noise amplifier and filter integrated
into feed for PCS interference protection
- New LNB design offers low noise figure, high dynamic
range and third order intercept point
- New, improved lower noise block downconverter
(used with 7 & 13 GHz systems)

The MRC UltraScan is a highly ruggedized offset fed antenna enclosed in a low profile radome that minimizes space needs and wind loading. The feed is broadband covering the 2/2.5 GHz band; a dual-band model covers both the 2/2.5 GHz and 6.4/7 GHz bands. A triband model covers these as well as the 13 GHz band.

The MRC UltraScan antenna uses modern solid-state MMICs to perform RF switching in the feed, thus eliminating all electro-mechanical RF switches.

To provide optimal performance, the MRC UltraScan feed assembly includes low noise amplifiers, solid state RF switches, RF band filter, and microstrip combiners and hybrids in an integrated RF assembly. LNA gain reduction is provided as a standard feature to reduce receiver overloading under strong signal conditions.

In addition, the overall power requirements of the rotating system and feed assembly are lower than those of traditional systems, thereby reducing the size and weight of the interconnecting control cable.

The feed design permits a full range of remote switching options with the LNA/block down converter mounted in close proximity to the feed to minimize the loss occurred through cables.

The dual-speed rotator is enclosed in a low-profile, aesthetically pleasing radome. It has been designed using proven technology for reliability. Lightning and surge suppression is provided within the unit. The rotator and enclosure are constructed of aluminum and stainless steel, thus eliminating the possibility of corrosion.

The new MRC UltraScan II central receive antenna option features a newly designed front-end, which consists of a solid-state pin diode switching unit. A new sharper response RF bandpass filter, and new high dynamic range LNA design are also employed. This design was initiated to combat the interference issues which have become commonplace with the introduction of PCS systems adjacent to ENG central receive sites. The combination of a high dynamic range LNA and sharper filtering make the MRC UltraScan II a "bullet-proof" solution to the problem of PCS interference.

The MRC UltraScan can be ordered with a continuous rotation option, which includes slip rings and an RF rotary joint. Adaptive Broadband also offers a range of modern, easy to use antenna control systems for the MRC UltraScan antenna and the MRC Millennium CR Central Receiver.



MRC ULTRASCAN CENTRAL RECEIVE SPECIFICATIONS

GENERAL

Antenna Type:	Offset Fed Parabola		
Model:	2 GHz	6.5/7 GHz	13 GHz
Frequency			
Range (GHz)*:	1.99 - 2.5	6.45 - 7.125	12.7 - 13.2
Gain, nominal†: 20 dBi		30 dBi	35 dBi
Beamwidth,			
Horizontal**:	14°	4.2°	2.5°
Beamwidth,			
Vertical**:	22°	7.2°	7.5°
Front to Back Rejection:		-25 dB minimum	
Side Lobe Rejection:		-20 dB minimum	

* 1.7 to 1.85 and 2.3 to 2.7 GHz also available.

† Gain is for basic antenna net of switching options.

** HPBW specifications are mid-band.

REFLECTOR

Type:	18" x 30" offset
Construction:	High strength, lightweight
Polarization:	Quad polarization standard (left circular, right circular, horizontal, and vertical)

FEED

Configurations:	2 GHz Broadband, 2/7 GHz Dual Band, or 2/7/13 GHz Triband
LNA:	Built in 26 dB gain LNA
Dual Band:	6.4/7 GHz block downconverter
Triband:	6/13 GHz block downconverter

ROTATOR

Dual Speed:	Slow: 3°/second Fast: 15°/second
Operating Wind Load:	Exceeding 100 mph
Rotation:	360°, -5°overlap

ENVIRONMENTAL

Temperature Range:	-30°C to +60°C
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PHYSICAL

Reflector Size:	18" h x 30" w (46 x 76 cm)
Antenna Size with Radome:	28" h x 35" dia (71 x 89 cm)
System Weight:	65 lbs (29.5 kg)

ORDERING INFORMATION

ULTRASCAN ANTENNA SYSTEMS

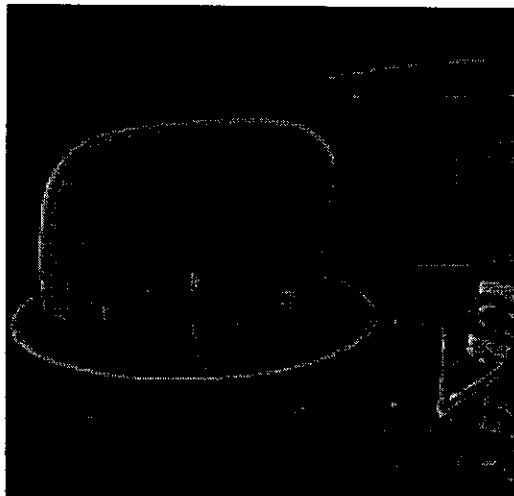
903655-1	2/2.5 GHz UltraScan Quad Polarization
903655-2	2/7 GHz UltraScan Dual-Band Quad Polarization
903655-3	2/2.5 GHz, Quad Polarization, Continuous Rotation
903655-4	2/7 GHz Dual-Band Quad Polarization, Continuous Rotation

ULTRASCAN II ANTENNA SYSTEMS

USCANII-2	2/2.5 GHz UltraScan II Quad Polarization
USCANII-27	2/7 GHz UltraScan II Dual-Band Quad Polarization
USCANII-2C	2/2.5 GHz, Quad Polarization, Continuous Rotation, UltraScan II
USCANII-27C	2/7 GHz Dual-Band Quad Polarization, Continuous Rotation, UltraScan II
USCANII-2713	Triband Quad Polarization
USCANII-2713C	Triband Quad Polarization, Continuous Rotation

ULTRASCAN OPTIONS

842746-2	Control cable and connectors (specify length in feet)
901586-1	High Gain Linear Amp, 30 dB, DC without bypass
901586-2	High Gain Linear Amp, 30 dB, DC with bypass



MRC ULTRASCAN ANTENNA

With radome removed.



ADAPTIVE BROADBAND

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Adaptive Broadband products are manufactured under a quality system certified to ISO 9001. Adaptive Broadband reserves the right to make changes to specifications of products described in this data sheet at any time without notice and without obligation to notify any person of such changes.

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Parabolic Dish

GMS Parabolic

GMS high accuracy parabolic spun aluminum dishes are designed with rugged portability in mind. The selection of wide band, quick connect feeds are available from 1.7 Ghz with Linear or Circular polarization. Three sizes (14, 24, 30") and a variety of mounting configurations make these the professionals parabolic of choice for portable applications.

Let us help you configure your application, simply click on the "Sales Help" button at the top of this page.

14 Inch (35.5 cm) Diameter, Spun Aluminum, 2 lbs.

Band	Polarization	Size	Gain	Beamwidth
4.4 - 5.0 Ghz	Linear	14" round	21.7 dBi	14 deg.
5.7 - 5.9 Ghz	Linear / RHCP	14" round	23 dBi	12 deg.
6.4 - 7.4 Ghz	Linear / RHCP	14" round	25 dBi	9.5 deg.
12 - 16 Ghz	Linear	14" round	31 dBi	4 deg.

24 Inch (61 cm) Diameter, Spun Aluminum, 5 lbs.

Band	Polarization	Size	Gain	Beamwidth
1.7 - 2.7 Ghz	Linear / RHCP / LHCP	24" round	20 dBi	16 deg.
4 - 6 Ghz	Linear / RHCP / LHCP	24" round	27 dBi	7 deg.
6.4 - 7.2 Ghz	Linear / RHCP / LHCP	24" round	30 dBi	5 deg.
12 - 14.3 Ghz	Linear	24" round	36 dBi	2.6 deg.

30 Inch (76.2 cm) Diameter, Spun Aluminum, 7 lbs.

Band	Polarization	Size	Gain	Beamwidth
1.7 - 2.5 Ghz	Linear / RHCP / LHCP	30" round	22 dBi	12.6 deg.
4.4 - 5 Ghz	Linear / RHCP / LHCP	30" round	29 dBi	5.6 deg.
5.7 - 5.9 Ghz	Linear / RHCP	30" round	31 dBi	4.5 deg.
6.4 - 7.4 Ghz	Linear / RHCP / Dual port RHCP & LHCP	30" round	32.5 dBi	3.75 deg.
12 - 16 Ghz	Linear	30" round	38.5 dBi	1.75 deg.

Grid Type Truncated Dish, Magnesium 2.5 & 4.5 lbs.

Band	Polarization	Size	Gain	Beamwidth
2.1 - 2.7 Ghz	Linear	16" x 20"	18 dBi	14 deg.
2.1 - 2.7 Ghz	Linear	24" x 36"	24 dBi	7.5 deg.